

New records of *Marmosops noctivagus* (Tschudi, 1845) (Didelphimorphia: Didelphidae) and first record of *Marmosops bishopi* (Pine, 1981) for Colombia

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ABSTRACT: Based on newly material from the Department of Putumayo and material collected in 1951 by Phillip Hershkovitz, the presence of *Marmosops noctivagus* is confirmed in at least three localities for Colombia. Additionally, the first record of *M. bishopi* is presented for Colombia extending its distribution by 750 Km northward.

The genus *Marmosops* is comprised of small-bodied marsupials of the family Didelphidae widely distributed in the humid forests of the Neotropics ranging from Panama to south of Brazil and Bolivia (Emmons and Feer 1997; Gardner and Creighton 2008). Several revisionary studies using molecular and morphological data have been recently developed to clarify the species limits within different genera of didelphid marsupials (*e.g.* Giarla *et al.* 2010; Gutiérrez *et al.* 2010; Rossi *et al.* 2010); nonetheless, the genus *Marmosops* has been absent from such revisions and remains taxonomically problematic. As a consequence, a significant fraction of the specimens deposited in scientific collections are either misidentified as species of other genera or lumped into polytypic species with suspiciously large distributions. Herein, new records of *Marmosops noctivagus* for Colombia are presented based on both misidentified material and positively identified material vaguely mentioned in the literature. Additionally, the first record of *Marmosops bishopi* for Colombia is presented based on a misidentified museum specimen.

The following morphological descriptions are based on adult specimens (*sensu* Voss *et al.* 2001) and follow the terminology described by Voss and Jansa (2003; 2009), Rossi *et al.* (2010) and Díaz-N *et al.* (2011). Measurements were taken with a digital caliper to the nearest 0.01 mm following Voss *et al.* (2004). The specimens herein described are deposited at the Field Museum of Natural History, Chicago (FMNH), and the Instituto de Ciencias Naturales, Bogotá (ICN). Identification of the material at the genus-level follows Voss and Jansa (2009). Due to the old and vague original description of the species (Tschudi 1845) and the apparent absence of a type specimen (Tate 1933), the species-level identification of *Marmosops noctivagus* can be contentious. Consequently, for the purposes of this note I will follow the description of *M. noctivagus* given by Voss *et al.* (2004) and Voss and Jansa (2009). The identification of material herein referred to as *M. bishopi* follows the descriptions of Pine (1981) and Voss

et al. (2001; 2004).

Marmosops noctivagus. Phillip Hershkovitz (1992) published a taxonomic revision of Neotropical marsupials of the genus *Gracilinanus*, where he included—for comparison purposes—information of other genera of small opossums (Hershkovitz 1992; table 4). Among the species he used for comparison was *Marmosops noctivagus*, with reference to 15 individuals he collected in 1951 in the Southern lowlands of Colombia (Hershkovitz's field notes). These specimens were deposited at the Field Museum of Natural History, Chicago (FMNH). Prior to his publication (Hershkovitz 1992) all known records of *M. noctivagus* were from south of Río Putumayo; therefore, the species was presumably absent from Colombia (Tate 1933; Cabrera 1958; Eisenberg 1989; but see Cuervo-Díaz *et al.* 1986). Despite Hershkovitz' collections, all subsequent works dealing with the distribution of *M. noctivagus* did not consider the Colombian specimens (*e.g.* Gardner 1993; Emmons and Feer 1997; Alberico *et al.* 2000; Brown 2004; Gardner 2005; Gardner and Creighton 2008). The present records—based on Hershkovitz' s material and on two specimens deposited at the ICN misidentified as *Marmosa murina* (see Polanco-Ochoa *et al.*, 1999)—corroborate the presence of *M. noctivagus* in Colombian territory in at least three localities (Figure 1).

Description of Colombian material (Figure 2): As for the species, these are large specimens in external and cranio-dental measurements (Table 1). Dorsally, these specimens are covered by chestnut-brown to dark chestnut-brown hairs. The ocular mask is black and contrast with the dorsal coloration. Lateral hairs are lighter, marking a transition between the dark dorsum and the white venter. The venter is entirely covered by a continuous band—from chin to anus—of self-colored white or buff hairs that extend to the anterior and posterior limbs. No trace of a band of gray-based hairs bordering the self-colored hairs is present. Only one female (FMNH 70961) from Putumayo shows a yellowish (not reddish or rusty as other *Marmosops*

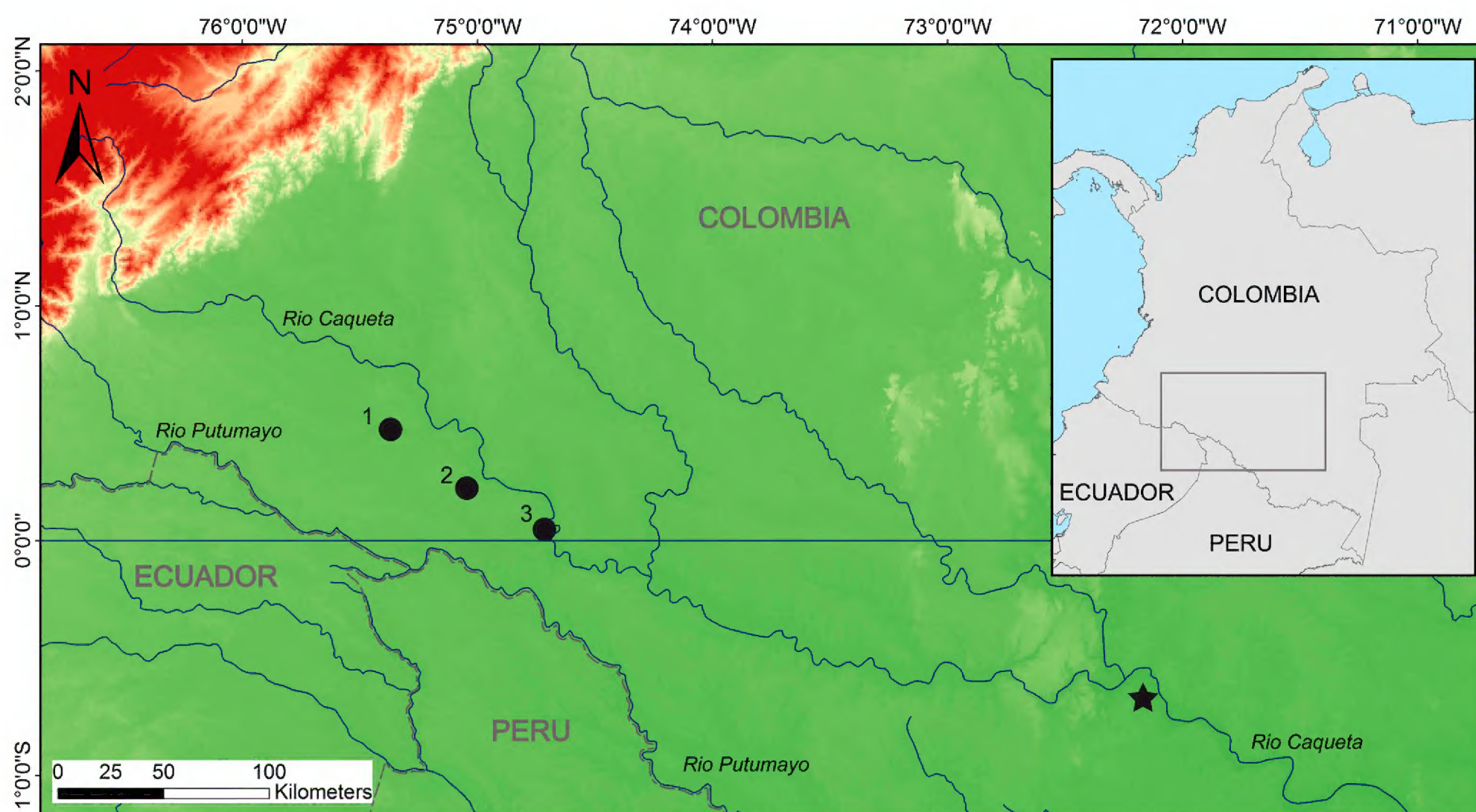


FIGURE 1. Localities of the material on which the present report is based. Circles represent *Marmosops noctivagus* localities as follows: Río Mesay (1), La Paya (2), and Tres Troncos (3). The star corresponds to *M. bishopi* locality at Vereda Peña Roja. Dashed line demarks country boundaries. For complete locality data see material examined in the text.

species) coloration in the mammary area, and all other females—which are old enough to have pigmented mammary areas—do not present any distinctive coloration (FMNH 70957, 70959, 70960). Testes in males are unpigmented and covered by white hairs. A stripe of brown hairs extend to the dorsal surface of the manus, which is otherwise mainly covered by white self-colored hairs; pes are completely covered by self-colored white hairs that do not contrast with the digits. The forearm has single ulnar antebrachial vibrissae. Tail is long, bicolored (darker dorsally, paler ventrally), but never parti-colored (although some *M. noctivagus* specimens may exhibit parti-colored tails, as observed by Voss *et al.* 2004). Males have robust blade-like lateral carpal tubercles, females do not have lateral carpal tubercles, and both sexes consistently lack medial carpal tubercles.

The skull has a particularly long rostrum. Nasals are expanded at the maxillo-frontal suture. Frontals have well-developed supraorbital ridges, but there is no trace of laterally projecting postorbital processes. The supraorbital ridges extend posteriorly into the braincase to form well-developed temporal crests that connect (in some specimens more conspicuously than in others) with the lamboidal crest. Both the supraorbital ridges and temporal crests are more-or-less subparallel; however, some old male specimens have supraorbital ridges that tend to converge posteriorly (*e.g.* ICN14466, FMNH70946). As in most small didelphids, the degree of ossification of the supraorbital ridges and temporal crests is correlated with age and sex, old males having the highest ossification and females with the lowest. The palate has incisive foramina, maxillopalatine fenestrae, palatine fenestrae, and posterolateral palatal vacuities but lacks maxillary fenestrae. The palatine fenestrae are small and there are usually two on each side (but more can

be found). The posterolateral palatal foramina are small, oval and usually do not reach M4. The fenestrae between squamosal and parietal can be either present or absent (as described by Voss and Jansa 2009). Subsquamosal fenestrae are small and rounded; therefore, the only visible area of the petrosal bone is the sulcus of prootic sinus. The auditory bullae are small, conical, and laterally compressed. Dentally, upper canines are robust, large (3 to 4 times longer than P1), and lack accessory cusps. The size of C1 is also correlated with age and sex (adult males have the largest canines and females have the smallest). Upper third molar (M3) consistently lacks anterior cingulum. In the lower tooth row c1, p2 and p3 are almost subequal in height (the canine can be slightly taller) and p1 is half (or a third) the size of c1. Lower canines are large and without posterior cusp in males; females have smaller canines and tend to develop small posterior cusps.

Material examined: COLOMBIA. Departamento Putumayo, La Tagua, Tres Troncos, Río Caquetá (0°08' N, 74°41' W; ca.150 m) (geographic coordinates from Instituto Geográfico Agustín Codazzi 2002): FMNH70946 (Adult male), FMNH70947 (Adult male), FMNH70948 (Juvenile male), FMNH70949 (Adult male), FMNH70950 (Juvenile male), FMNH70951 (Subadult male), FMNH70952 (Adult male), FMNH70957 (Adult female), FMNH70958 (Adult female), FMNH70959 (Adult female), FMNH70960 (Adult female). Departamento Putumayo, San Antonio, Río Mecaya (0°28' N, 75°20' W; 185 m) (geographic coordinates from Paynter 1997): FMNH70953 (Juvenile male), FMNH70954 (Adult male), FMNH70955 (Juvenile male). Departamento Putumayo, Puerto Leguizamo, Vereda El Guadual, Finca de Pablo Aguirre, Lomas 1, Vega Río Cauca, PNN La Paya (0°16' N, 75°1.2' W; ca. 200m) (geographic coordinates from Instituto Geográfico Agustín Codazzi 2002): ICN14465 (Adult male), ICN14466 (Adult male).

TABLE 1. Measurements (average and range) of Colombian material of *Marmosops noctivagus* and *M. bishopi*. Description of measurements and abbreviations follow Voss *et al.* (2004).

	<i>Marmosops noctivagus</i>				<i>Marmosops bishopi</i>
	Males (N=7)		Females (N=5)		Male (N=1)
HBL	148.00	(140 - 170)	138.80	(130 - 145)	93.00
LT	177.60	(148 - 200)	175.40	(170 - 186)	148.00
HF	19.40	(16 - 21)	19.40	(18 - 20)	19.00
Ear	22.75	(21 - 25)	22.20	(21 - 24)	18.00
CBL	39.02	(35.57 - 42.57)	37.41	(37.17 - 37.64)	-
NB	4.84	(4.60 - 5.25)	4.37	(4.27 - 4.50)	3.71
LIB	6.59	(6.16 - 7.51)	6.29	(6.11 - 6.43)	5.77
ZB	19.58	(18.53 - 21.95)	18.85	(18.20 - 19.24)	14.37
PL	22.54	(20.36 - 24.59)	20.86	(19.83 - 21.85)	15.74
PB	11.63	(10.32 - 12.19)	11.56	(11.18 - 11.86)	8.39
MTR	15.94	(13.85 - 16.67)	15.24	(14.85 - 15.79)	11.33
LM	7.85	(6.64 - 8.15)	7.65	(7.57 - 7.76)	5.63
M1-M3	6.88	(5.83 - 6.96)	6.62	(6.54 - 6.80)	5.08
WM4	2.73	(2.31 - 2.88)	2.73	(2.54 - 3.05)	1.93
Weight	66.50	(48 - 85)	-	-	24.10



FIGURE 2. Skull and mandible of adult male *Marmosops noctivagus* (ICN14466) from Departamento Putumayo, Colombia. Scale bar = 10 mm.

***Marmosops bishopi*.** The species is known to occur in western Brazilian Amazon, lowlands and eastern slopes of the Andes of Peru and Bolivia (Gardner and Creighton 2008). The northernmost published record of the species is for Barro Vermelho, Brazil (Patton *et al.* 2000; Gardner and Creighton 2008). The present description—based on a single adult male (ICN18338) erroneously labeled as *Marmosops parvidens* from the Colombian Amazon—extends the known distribution of the species by ca. 750 Km northward.

Description of Colombian material (Figure 3): Although some external and cranio-dental measurements of ICN18338 (Table 1) can be larger than those of Bolivian populations (see Voss *et al.* 2004) the morphology corresponds otherwise to what is described for the species. The specimen has chesnut brown dorsal hairs, darker in the midline of the dorsum, paler on the sides and on the head between the black ocular masks. There is a continuous broad band—almost, but not as wide as the venter—of self-colored white hairs extending from chin to anus bordered by a narrow band of gray-based hairs. Self-colored white hairs are also present around the lips, ventrally on the fore and hind limbs, and cover the white scrotal epithelium. Manus and pes are dorsally covered by self-colored white hairs that do not contrast with the digits. The forearm has two ulnar antebrachial vibrissae (distal and proximal). The tail is dark and sharply bicolored. Blade-like lateral carpal tubercles are present, and medial carpal tubercles are absent.

The skull has nasals that expand at the maxillo-frontal suture. Frontals and parietals tend to be rounded (no trace of laterally projecting postorbital processes) with only a faint development of subraorbital ridges and temporal crests. The palate has short and narrow maxillopalatine fenestrae (only extending from mid-P3 to M2 metacone), lacks palatine and maxillary fenestrae, and the posterolateral palatal foramina are small, ovale, slightly visible in ventral view, and do not reach M4. Subsquamosal fenestrae are anteroposteriorly elongated exposing a large area of the petrosal bone that includes the sulcus of prootic sinus (Díaz-N *et al.* 2011, Figure 6B). The auditory

bullae have some degree of lateral constriction. Dentally, the upper canines have posterior accessory cusps, and the third upper molar (M3) has a narrow, but nonetheless present, anterior cingulum. The lower canine (c1) has a small posterior cusp and is subequal in height to p1. Lower second premolar (p2) can be twice as high as p1.



FIGURE 3. Skull and mandible of adult male *Marmosops bishopi* (ICN18338) from Departamento Amazonas, Colombia. Scale bar = 10 mm.

Material of *Marmosops bishopi* is often misidentified as *M. parvidens*, a species mainly distributed in French Guiana, Guyana, Surinam, northern Brazil, and some isolated populations on the North of the Andes (Gardner and Creighton 2008). Given that useful characters for identifying these species might be sexually dimorphic and because the present report is based on a male *M. bishopi*, the characters presented for distinguishing these two species are only based on male specimens. The following characters of *M. parvidens* are based on what is reported for material mainly from the Guiana (Voss et al. 2001). Male *M. bishopi* can be easily distinguished from males of

M. parvidens by the presence of blade-like lateral carpal tubercles and a single posterior accessory cusp in the upper canines; by contrast, *M. parvidens* has spoon-shaped lateral carpal tubercles and both anterior and posterior accessory cusps in the upper canines (Voss et al. 2001).

Material examined: COLOMBIA. Departamento Amazonas, Leticia, Vereda Peña Roja (0°41.3' S, 72°08' W; 300m) (geographic coordinates from Instituto Geográfico Agustín Codazzi 2002): ICN18338 (Adult male).

Before the present records, Río Putumayo could have been hypothesized as a barrier to the northward dispersion of the two species included in this report. Although large rivers can be notorious barriers for the dispersion of some mammal species in the Amazon (Wallace 1852; Hershkovitz 1977), and some might even prevent genetic flow promoting diversification (Ayers and Clutton-Brock 1992; da Silva and Patton 1998), Río Putumayo does not seem to have such properties. For instance, recent work has shown that populations of other small opossums occur north and south of Putumayo River (Rossi et al. 2010; Voss et al. 2009) and that some Amazonian tributaries do not appear to be important barriers as initially hypothesized (Gascon et al 2000; Patton et al 2000). The scarcity of records of these species (and almost certainly many others) in the Colombian Amazon is more likely to be related to a lack of sampling in this region. As shown by other authors (Voss and Emmons 1996) the northwestern quadrant of the Amazon is the least explored area within the Amazon basin and is therefore in urgent need of sampling.

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